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Clinical and Histopathological Study of Leprosy Cases: Importance of Biopsy in Accurate Subtyping of the Spectrum of Hansen's Disease

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Abstract : ***Introduction:*** *Leprosy elicits spectrum of clinical, immunological and histological features. It is classified into 5 types according to Ridley and Jopling classification. . Proper diagnosis, subtyping and treatment play the main role in decreasing leprosy case load. Histopathological examination of skin and nerve lesions is the gold standard for confirmation of clinically suspected cases and classification.*
Aim of the study*: Present study was conducted to study various types of leprosy cases in our population and its clinico-pathological correlation.*
Materials and method*: A three year retrospective study was conducted in which a total 28 clinically diagnosed cases of leprosy were included. Detailed clinical presentations and spectrum of cases were recorded. Skin biopsies from the lesions were stained with Hematoxylin-Eosin stain for histomorphological study and Fite Farraco stain for detection of acid fast bacilli.*
Results*: Out of total 28 cases, 16 cases were of male and 12 cases were female (1.3:1). Average age of patients was 38.9 years. Most common presentation found was asymptomatic plaque (29.6%) followed by nodules(25.9%) , hypopigmented patch (22.4%), ulcer(7.4%) , erythematous plaque (7.4%) and mixed presentation in 7.4% cases. Clinically most common type of leprosy was Borderline Tuberculoid (BT) while histologically Borderline Tuberculoid(BT), Lepromatous Leprosy(LL) and Indeterminate Leprosy(IL) each comprised of 18.5% cases. Correct clinical subtyping was done in 39% cases with maximum correlation in Histioid leprosy(100%) followed by Type 1 lepra reaction (75%).*
Conclusion: *The spectrum of leprosy shows considerable overlap. Therefore , both clinical and histological characteristics with staining for lepra bacilli is the best approach to arrive at a correct diagnosis of these cases.*
Keywords : *Clinicopathological correlation, Histopathology, Leprosy, spectrum.*

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I. Introduction

Leprosy is a chronic infection caused by Mycobacterium leprae and Mycobacterium lepromatosis. It is also known as Hansen's disease, named after G. Armauer Hansen who discovered M. leprae. Clinical and histopathological features of leprosy depend on cell mediated immunity of host against the organism.[1] Infection occurs through skin to skin transmission. Respiratory tract is also considered to be portal of entry. It mostly involves skin and peripheral nerves,but visceral organs like spleen, testes, bone, muscle,eyes may be involved in some cases.[2]

Leprosy elicits spectrum of clinical, immunological and histological features. It is classified into 5 types according to Ridley and Jopling classification, proposed in 1960s.[2] There are two poles in the spectrum, one is Tuberculoid leprosy(TT) and the other is Lepromatous leprosy(LL). In between these two, lie borderline tuberculoid (BT), Borderline(BB) and Borderline lepromatous(BL).[3] Histoid leprosy is a variant of lepromatous leprosy with highest load of bacilli and hence it is a great reservoir of infection.[4]

Leprosy has been considered as major public health problem in India. With the help of WHO guidelines of early diagnosis and treatment, India has achieved Elimination (<1/10,000population) in 2005 and even further down to0.66/10,000 in 2016.[5] Still new cases are being reported and India makes up 60% of global leprosy case load.

Proper diagnosis, subtyping and treatment play the main role in decreasing leprosy case load. Histopathological examination of skin and nerve lesions is the gold standard for confirmation of clinically suspected cases and classification that help to improve treatment regimen and assess risk of complication.[6]. Present study was conducted to study various types of leprosy cases in our population and its clinico-pathological correlation.

II. Materials and methods

A three year retrospective study was conducted from 2016 to 2019 in the department of Pathology of a teaching institute in north- east India. Total 28 clinically diagnosed cases of leprosy were included in the study irrespective of age and sex. Detailed clinical presentations and spectrum of cases were recorded. Histoid leprosy and reactional leprosy cases were also included in our study.

Skin biopsies from the lesions were taken and fixed in 10% buffered formalin. The tissues were processed according to standard protocol. Sections were stained with Hematoxylin-Eosin stain for histomorphological study and Fite Farraco stain for detection of acid fast bacilli. All slides were examined under microscope. Then all the data were analysed and clinico-histological correlation was done.

III. Results

Out of total 28 cases, 16 cases were of male and 12 cases were female (1.3:1). Age of presentation ranged from 10 years to 73 years, maximum cases (29.6%) belonged to 30-39 years of age group. [Table1]. Average age was 38.9 years.

Table 1. showing age distribution of the cases

Age (in years)	No. of cases
10-19	2
20-29	5
30-39	8
40-49	6
50-59	2
60-69	2
70-79	3

Clinical presentations of patients were analysed. Most common presentation found was asymptomatic plaque (29.6%) followed by nodules(25.9%) and hypopigmented patch (22.4%), rest were ulcer(7.4%) , erythematous plaque (7.4%) and mixed presentation in 7.4%.In the study it was found that asymptomatic plaque was most commonly associated with Borderline Tuberculoid(BT) and nodular lesions with Lepromatous leprosy(LL). [Table2]. Thickened nerves were found in 14% of cases. Based on location of lesions, most commonly involved were upper extremities (33.1%) followed by lower limbs (29.6%) and trunk(11.3%). Whole body involvement was found in 18.5% of cases. [Table3]. All cases(100%) where whole body involvement was found, were in Lepromatous pole (LL and Histoid leprosy). Clinically most common type of leprosy was Borderline Tuberculoid leprosy.

Out of 28 clinically diagnosed cases, 27(96.42%) cases were histologicaly confirmed as leprosy. 1 case was diagnosed as non specific dermatitis. 27 confirmed cases were classified histologically according to Ridley and Jopling classification. Cases of Borderline Tuberculoid(BT), Lepromatous Leprosy(LL) and Indeterminate Leprosy(IL) were of same number;each comprised of 18.5%. Histoid leprosy , variant of Lepromatous was found in 3 cases (11%) and Type 1 Lepra reaction in 14.8%. No borderline (BB) case was found histologically.[Table4]

In 9 out of 27 confirmed cases, clinical diagnosis was given as Hansen's disease and no spectrum was given. Histologically these were classified and Indeterminate leprosy was the most common. Clinico-histopathological correlation was done in rest 18 cases. Correct clinical subtyping was done in 11 cases (39%). Maximum correlation was seen in Histoid leprosy(100%) followed by Type 1 lepra reaction (75%).[Table5].

Table 2. showing clinical presentation of different types of leprosy

Clinical presentation	BT	TT	BL	LL	Histoid Leprosy	IL	Type 1 lepra	Total
Asymptomatic plaque	4	1			1	1	1	8
Hypopigmented patch	1	1	1			1	2	6
Nodule		2		4	1			7
Ulcer						2		2
Erythematous Plaque						1	1	2
Mixed				1	1			2

Table 3. showing total number of cases according to site of lesion

Site of lesion	No. of cases	Percentage(%)
Upper limbs	9	33.1
Lower limbs	8	29.6
Trunk	3	11.2
face	2	7.4
Whole body	5	18.5

Table 4. showing the histological spectrum of leprosy cases (Fig 1-5)

Histological Spectrum	No. of cases	Percentage(%)
IL	5	18.5
BT	5	18.5
TT	4	14.8
BL	1	3.7
LL	5	18.5
Histoid	3	11.2
Type1 lepra	4	14.8

Table 5. showing clinical and histopathlogical correlation of the cases

Clinical type	No. of cases	Histopathological spectrum							Correlation (%)
		BT	TT	BL	LL	Histoid	Type1 lepra	IL	
BT	5	2	1		1		1		40%
TT	2		1		1				50%
BL	1				1				0%
LL	3				2			1	66.7 %
Histoid	3					3			100 %
Type1 lepra	4			1			3		75 %

Fite farraco staining was done in all cases.(Fig6). It was positive in 11 cases (39.3%). Out of these, 3 cases were Lepromatous Leprosy(60%), 3 histoid (100%), 2 IL(40%) , 2 BT(40%) and 1 TT(20%).

IV. Discussion

In the present study, male outnumbered female(1.3:1) as observed in study by Shrestha A et al.[2] Most common spectrum in male was Lepromatous leprosy and in female was Borderline Tuberculoid. Age of presentation ranged from 10 years to 73 years in our study, maximum cases belonged to 30-39 years. It was found that children were least affected in our study, also reported in other study by Moorthy et al.[6][7]

In our study , it was found that in 96.4% cases clinical diagnosis of leprosy was correct, confirmed by histopathology. But for spectrum, correlation was found in 39 % cases, maximum correlation was found in Histoid leprosy(100%) followed by type 1 lepra as noted in other studies. In a study by Giridhar M et al, in 98% cases of clinically suspected cases, histological diagnosis of leprosy was established and correlation was maximum in Lepromatous leprosy(LL).[7].

Histoid leprosy was also included in our study. It was found mostly in younger adults. Male preponderance was seen, cases presenting with nodules and papules over the entire body. Similar finding was found in study by Wade HW et al. and Pandey et al[8][9]. Bacilli were detected with Fite farraco stain in 100% of these cases. Reactional leprosy cases were also included. Type 1 Lepra reactions were found in 4 cases. No ENL case was found in our study. Type 1 lepra reaction was found in mostly BT and TT cases, findings are consistent with study by Adhe V et al.[10].

Clinically most common spectrum in the present study was Borderline tuberculoid (BT) and histologically Borderline Tuberculoid, Indeterminate leprosy and lepromatous leprosy were of same numbers. No Borderline (BB) case was found clinically or histologically. In a study by Lobo AC et al, same finding was found, but here most common histological spectrum was borderline tuberculoid(BT).[11] In our study, most common clinical presentation was asymptomatic plaque followed by hypopigmented patch. While in a study by Vasikar M et al, most common presentation was hypopigmented macules followed by plaque; most common clinical and histological spectrum was BT, maximum parity was also seen in BT.[12]

V. Conclusion

The histopathological spectrum of cases included Indeterminate, Borderline tuberculoid, borderline lepromatous, tuberculoid, lepromatous, histoid and Type 1 lepra reactions. Although in our study the clinical diagnosis correlated with histopathology in a high percentage of cases, when it came to specific subtyping and classification of these cases, the clinicopathological correlation was only 39%. The spectrum of leprosy is very wide and shows considerable overlap. Therefore , both clinical and histological characteristics along with staining for lepra bacilli is the best approach to arrive at a correct diagnosis of these cases in order to facilitate appropriate therapy.

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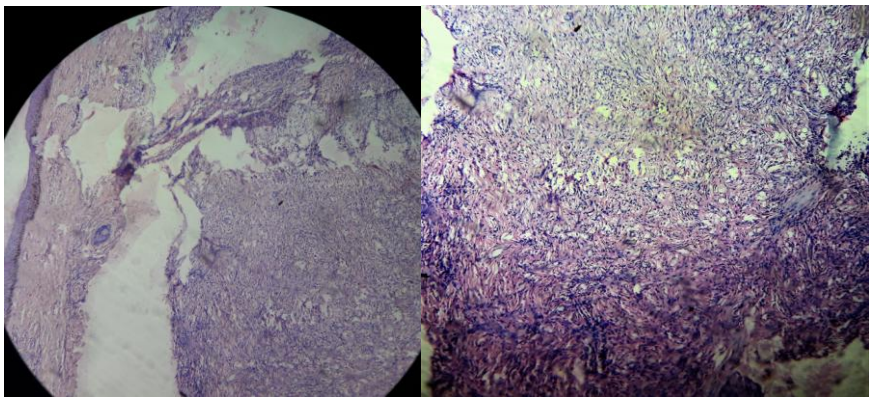

Figure 1.Histoid leprosy showing atrophic epidermis with spindle cell proliferation of macrophages in a storiform pattern in the dermis.

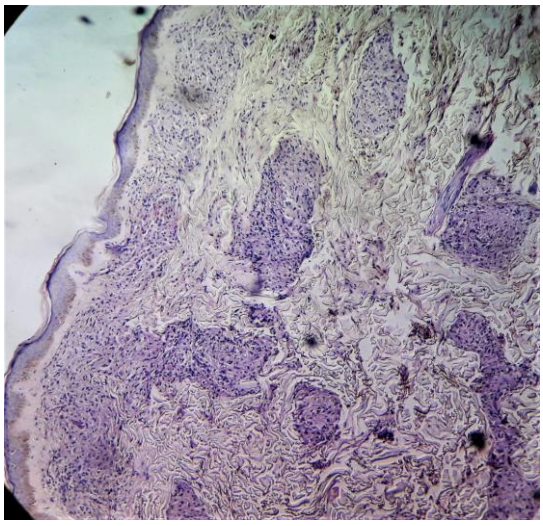

Figure 2.Lepromatous leprosy showing flattened epidermis separated from extensive infiltration of histiocytes in dermis by a clear narrow grenz zone of normal collagenous tissue.

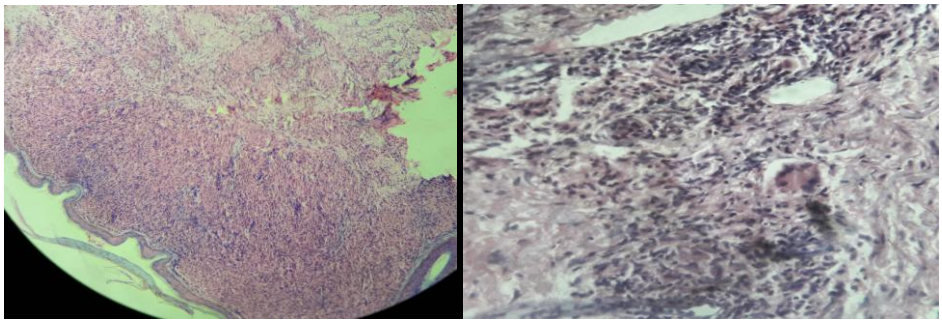

Figure 3. Tuberculoid leprosy showing infiltration of epithelioid cells,lymphocytes, langhans giant cells forming granuloma in dermis.

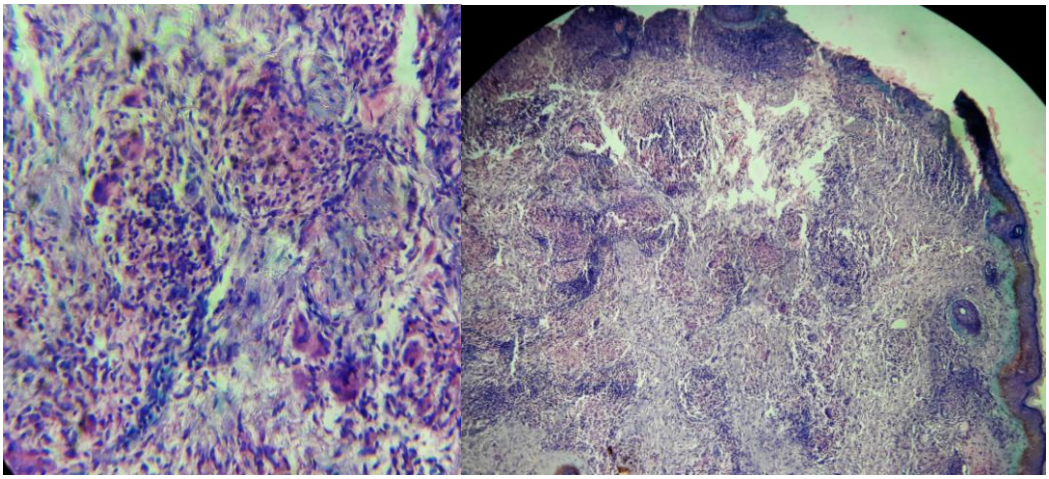

Figure 4. type 1 lepra showing granuloma formation, giant cell and edema within and around granuloma.

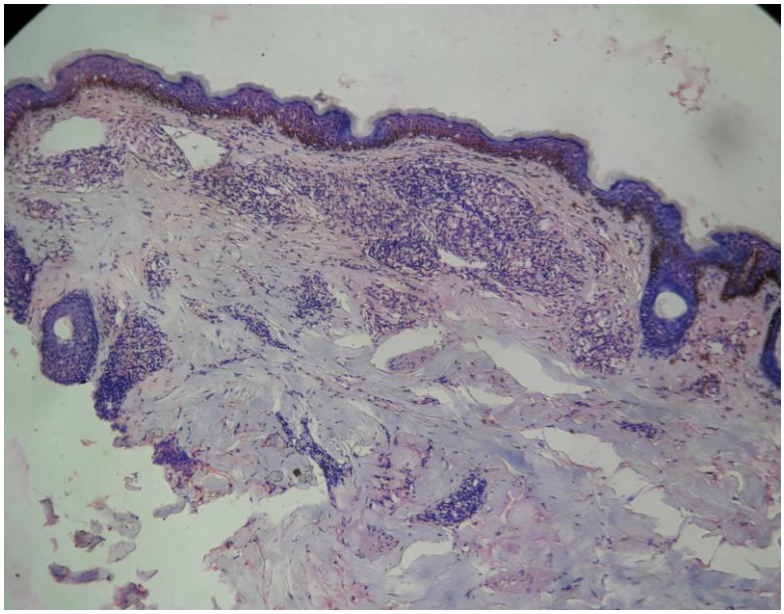

Figure 5.Borderline tuberculoid showing pandermal periadnexal and perivascular lymphohistiocytic infiltration and scattered epithelioid cells.

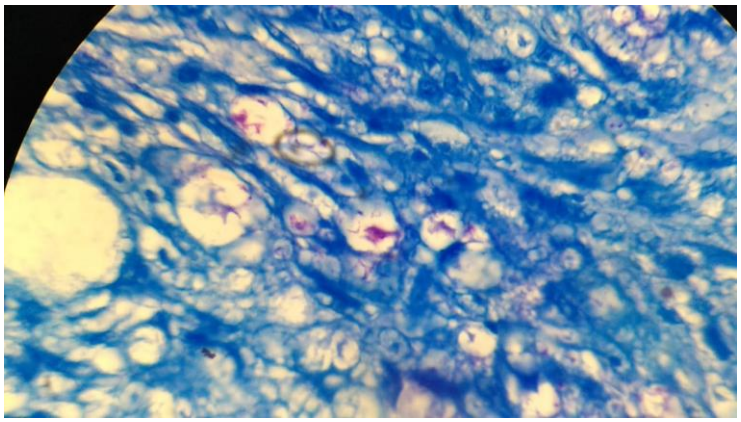

Figure 6. Fite farraco staining of histoid leprosy showing clumps of lepra bacilli.

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